

We claim:

1. A lock mechanism for a downhole tool, comprising:  
a stationary component and a final controlled element;  
a movable component movable with respect to said stationary component and linked to said final controlled element to put said final controlled element in at least two positions;  
a lock assembly triggered by a predetermined movement of said movable component that acts to impede movement of said movable component with respect to said stationary component.
2. The mechanism of claim 1, wherein:  
said lock assembly is automatically triggered when said final controlled element reaches a predetermined position.
3. The mechanism of claim 1, wherein:  
said lock assembly is releasable after it is triggered.
4. The mechanism of claim 2, wherein:  
said lock assembly is releasable after it is triggered.
5. The mechanism of claim 1, wherein:  
said lock assembly comprises a pair of shoulders that can pass by each other until said predetermined movement is reached whereupon a locking member extends at least one of said shoulders to selectively prevent them from passing each other.
6. The mechanism of claim 5, wherein:  
said locking member moves relatively to said shoulder that it extends.

7. The mechanism of claim 6, wherein:

said locking member comprises at least one collet mounted to said movable member.

8. The mechanism of claim 7, wherein:

said shoulder that is extended comprises a raised surface disposed between an upper and a lower recessed surfaces and said other of said shoulders comprises a no-go shoulder on said stationary component;

said collet clearing said no-go shoulder when positioned in said recessed surfaces.

9. The mechanism of claim 8, wherein:

said collet, when on said raised surface, engaging said no-go shoulder to impede movement of said movable component.

10. The mechanism of claim 9, wherein:

said raised and recessed surfaces are disposed on a sleeve that is mounted for relative movement with respect to said movable component.

11. The mechanism of claim 10, wherein:

said sleeve comprising a second no-go shoulder to selectively engage said no-go shoulder on said stationary component to alter the position of said collet with respect to said sleeve when said predetermined movement is made.

12. The mechanism of claim 11, wherein:

said predetermined movement comprises opposed movements of said movable component comprising a first movement where said no-go on said sleeve engages said no-go on said stationary component, while said movable component continues to move, to shift said collet to said lower recessed surface and a second movement of said movable

component opposite to said first movement where said collet passes said no-go on said stationary component and ends up on said raised surface.

13. The mechanism of claim 12, wherein:

said sleeve is urged to move during said second movement of said movable component until movement of said sleeve is stopped by said stationary component to allow said collets to move relatively to said sleeve and wind up on said raised surface.

14. The mechanism of claim 13, wherein:

said collet is selectively repositioned from a locked position on said raised surface to an unlocked position on a recessed surface as said final controlled element is urged into another of said two positions.

15. The mechanism of claim 5, wherein:

said lock assembly can be released by relative movement between itself and the shoulder that it had extended as a result of a part of said movable component being released to operate said final controlled element into another of its said two positions.

16. A lock assembly for a downhole valve, comprising:

a stationary housing:

a mandrel movably mounted with respect to said housing and connected to a valve member to selectively open and close said valve member in response to a predetermined movement of said mandrel;

a lock that automatically engages when said valve member reaches one of said open and closed positions, said lock selectively defeated to allow movement of said valve member to the other of said open and closed positions.

17. The assembly of claim 16, wherein:  
said lock selectively retains said mandrel to said stationary housing.
18. The assembly of claim 17, wherein:  
said lock comprises a collet connected to said mandrel and a sleeve movably mounted over said mandrel and further comprising a raised surface;  
said housing comprising an internal no-go shoulder;  
said lock operative to retain said mandrel to said internal no-go shoulder of said housing when said collet aligns with said raised surface on said sleeve.
19. The assembly of claim 18, wherein:  
said sleeve comprises at least one recessed surface, said collet clearing past said internal no-go shoulder when aligned with said recessed surface.
20. The assembly of claim 19, wherein:  
said at least one recessed surface on said sleeve comprises an upper and lower recessed surfaces respectively above and below said raised surface;  
said sleeve further comprises a second no-go shoulder such that movement of said mandrel with said no go shoulders in contact moves said collet from said upper to said lower recessed surface, whereupon reversal of mandrel movement direction said collet clears said internal no-go shoulder and said sleeve movement is stopped allowing said collet to ride up to said raised surface to lock said mandrel to said housing.